Remarks

Allowance of all pending claims is respectfully requested. Claims 1-3, 5, 8-10, 12, 15-17, 19 & 22-24 remain pending; including, independent claims 1-3, 8, 15 & 22.

By this paper, applicants amend independent claims 1-3, and cancel various dependent claims without prejudice, in a bona fide attempt to advance prosecution of the application and obtain allowance of certain claims. These amendments are not meant to acquiesce to the substance of the rejection contained in the Office Action. It is believed that the amendments place all claims in condition for allowance. Support for the amendments can be found throughout the application as filed, for example, reference page 28, line 17 – page 32, line 19. Thus, no new matter is added to the application by the amendment presented.

In the Office Action, claims 1-7, 10-14, 17-21, 24, and 25 were rejected under 35 U.S.C. 102(b) as being anticipated by Wolski et al. "2PC Agent Method: Achieving Serializability in Presence of Failures in a Heterogeneous Multidatabase", Databases, Parallel Architectures and Their Applications, PARBASE-90, International Conference on 7-9 March 1990, pp. 321-330 (hereinafter referred to "Wolski"); while claims 8-9, 15-16 and 22-23 were rejected under 35 U.S.C. 103(a) as being unpatentable over Wolski in view of Sonnier et al. (U.S. Patent No. 5,574,849A; hereinafter Sonnier). These rejections are respectfully traversed to any extent deemed applicable to the claims presented herewith.

As recited in claim 1, for example, applicants' invention comprises a method of serializing replicated transactions in a distributed computing environment. The method includes using a two phase commit process to initiate a modification operation on a replicated resource of a distributed computing environment; and during a first, prepare to commit phase of the modification operation, during which the commit process proceeds in parallel, detecting whether a conflict for the replicated resource exists. Thereafter, the method includes satisfying the existing conflict, without requiring locking of the replicated resource, the satisfying includes serializing the commit process during a second, commit phase, and proceeding in serial with the commit process without requiring reposting of the modification operation.

As a further recitation of the invention, claim 8 (for example) recites a method of serializing replicated transactions in a distributed computing environment. The method includes

initiating a modification operation on a resource of a distributed computing environment, the distributed computing environment including a processing group with a plurality of members, and wherein the modification operation comprises a plurality of phases. The method includes, during a first phase of the modification operation, detecting whether a conflict for the resource exists, and if so, satisfying the conflict. Satisfying of the conflict occurs without requiring explicit locking of the resource, and occurs during a second phase of the modification operation, wherein the second phase proceeds serially with respect to at least some of the plurality of members in order to satisfy the conflict. The satisfying includes at least one of the at least some of the plurality of members withholding information in order for the second phase to proceed serially.

With respect to the anticipation rejection of independent claims 1-3, it is well settled that a claimed invention is not anticipated unless a single prior art reference discloses: (1) all the same elements of the claimed invention; (2) found in the same situation as the claimed invention; (3) united in the same way as the claimed invention; and (4) in order to perform the identical function of the claimed invention. In this instance, Wolski fails to disclosure multiple aspects of applicants' amended independent claims, and as a result, does not anticipate (or render obvious) applicants' invention.

Wolski discloses a method for integrated concurrency controller recovery, applicable to heterogeneous multidatabase systems. The responsibility for a two phase local commitment and recovery of the prepared state at participants is taken over by an entity called 2PC Agent. The principal teaching of Wolski is in preserving global serializability in presence of certain class of participant-related failures. FIG. 2 of Wolski illustrates the 2PC protocol with an implied strict two phase locking.

Applicants respectfully submit that the independent claims presented herewith recite numerous features not taught or suggested by Wolski. For example, applicants' independent claims recite using a two phase commit process to initiate a modification operation on a replicated resource of a distributed computing environment. A careful reading of Wolski fails to uncover any discussion of a replicated resource per se. Wolski does disclose a two phase commit process which uses an implied two phase locking mechanism as shown in FIG. 2 thereof. In Wolski, global operations are propagated by a network message from a coordinator to

participants. However, Wolski does not discuss the particular two phase commit processing described in the independent claims presented.

Applicants' independent claims further recite during a first, prepare to commit phase of the modification operation, during which the commit process proceeds in parallel, detecting whether a conflict for the replicated resource exists. A careful reading of Wolski fails to uncover any discussion of detecting a conflict for a replicated resource during a first, prepare to commit phase of a modification operation. Even if Wolski implicitly detects conflicts, there is no discussion that that detection occurs during the first, prepare to commit phase of a two phase commit process. Further, FIG. 2, and page 324, Col. 1, section 2.3, paragraphs 2 and 3, do not discuss detection of a conflict per se. The Office Action's cited lines of page 324 discuss recovery using a 2PC Agent when a failure has occurred. However, applicants respectfully submit that failure and conflict are two different concepts, and that detecting a conflict does not equate to detecting a failure.

In addition, applicants recite satisfying the conflict, without requiring locking of the replicated resource. In applicants' claim, there is no locking of the replicated resource. The Office Action cites page 323, Col. 2, paragraph 1 for an alleged teaching of this aspect of applicants' invention. These lines of Wolski indicate that there is no explicit global lock protocol employed. However, the next sentence in the same paragraph indicates that the lock requests are implicit in the database management operations and, according to strict 2PL, these locks are only released at the global commit, as shown in FIG. 2 of Wolski. Thus, it is clear that Wolski is employing a locking protocol and, as such, avoids the conflicts addressed by the present invention.

In applicants' two phase commit process, an optimistic approach or functionality is recited, which allows for the prepare to commit phase to proceed in parallel, and then if a conflict is detected during this phase, to switch the two phase commit process to a serial process during the second, commit phase. Applicants respectfully submit that Wolski also fails to disclose this aspect of the claimed invention. The Office Action cites page 325, section 3.5, paragraph 3, which states that global subtransactions may be resubmitted in any order, however, the global history is view serializable. Applicants respectfully submit that the cited lines of Wolski are not relevant to applicants' claimed functionality. In particular, section 3.5 on page

325 of Wolski describes recovery from site failures. In contrast, applicants are reciting a two phase commit process which includes a second commit phase and the switching from parallel processing in the prepare to commit (first) phase to serial processing in the second, commit phase. Neither phases of the two phase commit process have to do with site failures or recovery therefrom. Thus, applicants respectfully submit that the Office Action mischaracterizes the teachings of Wolski in this aspect.

Independent claims 1-3 further recite proceeding in serial with the commit process during the second phase without requiring reposting of the modification operation to satisfy the conflict. Since Wolski does not expressly discuss conflict resolution, and since Wolski relies upon locking inherent in the database operations described therein, applicants respectfully submit that there is no functionality for resolving or satisfying conflicts described therein without requiring reposting of the modification operation. In fact, Wolski would expressly imply otherwise. Throughout the Wolski material, it is stated that the two phase commit agent disclosed therein maintains its own log, referred to as the agent log, solely for the purpose of recovery of subtransactions that had reached a prepared state. Every time a global subtransaction operation has been executed, the 2PCA writes the transaction to the log and that the log entry implicitly indicates successful lock reservations. Further, Wolski teaches that prepared state subtransactions averted by LTM are resubmitted from the agent log to the 2PCA. See sections 3.2 & 3.3 at pages 324 &325. These resubmitted subtransactions comprise to one skilled in the art, a reposting of transactions, and thus, Wolski teaches away from the recited functionality of applicants' invention, wherein conflicts are satisfied without requiring reposting of the modification operation.

For all of the above reasons, applicants respectfully request reconsideration and withdrawal of the anticipated rejection to the independent claims presented. The dependent claims at issue are believed allowable for the same reasons as the independent claims, as well as for their own additional characterizations.

With respect to the obviousness rejection of claims 8-9, 15-16 and 22-23, applicants respectfully submit that Sonnier also fails to teach or suggest the above-noted deficiencies of Wolski when applied against the independent claims presented. In fact, Sonnier does not appear to even describe a two phase commit process per se.

Sonnier describes synchronized data transmission between elements of a processing system. In Sonnier, storage elements are synchronized by providing each with a SYNC symbol that, when detected, causes the pointer counters to be placed in a predetermined (reset) state on one transition of a SYNC clock signal, releasing the pointer counters at the same time on a following transition of the SYNC clock signal.

The Office Action notes that Wolski does not teach certain functionality recited in applicants' independent claims 8, 15 & 22, wherein it is stated that the satisfying comprises at least one of the at least some of the plurality of members withholding information in order for the second phase to proceed serially. Sonnier is cited for allegedly teaching this aspect of applicants' two phase commit process. This conclusion is respectfully traversed.

A careful reading of Sonnier and in particular, Col. 56 & 81, fails to uncover any discussion relative to a two phase commit process. Further, a careful reading of the cited lines fails to uncover any teaching of a general concept of "withholding information by one member in order for a commit process to proceed serially." The cited lines do say that a sending device continues to send fill symbols, withholding further transmission of a message packet until the device was sent the busy commit symbol sends a ready symbol. However, this teaching of Sonnier does not equate to the functionality recited by applicants' in independent claims 8, 15 & 22. Applicants claim satisfying a conflict by serializing a modification operation of a commit process by at least one member withholding information in order for the second phase of the modification operation to proceed serially. In Sonnier, a device is simply holding message packets until a subsequent downstream device is able to accept the packets. This holding of message packets is not in order to allow an operation to proceed serially, but rather simply to avoid the message packets from being discarded.

Further, applicants respectfully submit that the justification for combining Sonnier with Wolski is deficient, that the documents themselves lack any teaching, suggest or incentive for their combination, and the combination is a hindsight reconstruction of the claimed invention using applicants own disclosed subject matter. The only justification given for the combination is the following language at the middle of page 6 of the Office Action:

> It would have been obvious...because when data is written at one
> location by more than one member at the same time error and data
> corruption will occur.

Noticeably absent from this justification is any express teaching, suggestion or incentive identified in the art for making the proposed combination. Just as in <u>Winner International Royalty Corp. v. Wang</u>, 48 U.S.P.Q. 2d 1139, 1144 (D.C. 1998), wherein the Court overturned a Board finding of obviousness, hindsight is always perfect and it is insufficient to prove at the time of the claimed invention, the separate elements of the device were present in the known art. "Rather, there must have been some explicit teaching or suggestion in the art to motivate one of even ordinary skill in the art to combine such elements so as to create the same invention." <u>Id.</u> <u>Winner's</u> cited authority, <u>Arkie Loures Inc. v. Gene Larew Tackle Inc.</u>, 43 U.S.P.Q. 2d 1294, 1297 (Fed. Cir. 1997), similarly holds that:

> It is insufficient to establish obviousness that the separate elements of the invention existed in the prior art, absent some teaching or suggestion, in the prior art, to combine the elements.

This justification does not identify a teaching, suggestion or incentive in the art to combine these references as required by cases like <u>Winner</u> and <u>Arkie</u>. This justification is simply a restatement of the results of the combination, rather than a reason for the combination drawn from the prior art or from the knowledge available to one of ordinary skill in the art.

Upon an independent review of the documents, there is no teaching or suggestion for their combination. In fact, as discussed above, Sonnier does not even describe a two phase commit process at all. Since Sonnier is not a two phase commit process, one of ordinary skill in the art would not find a suggestion therein for the combination proposed in the Office Action. Other fundamental differences exist between the documents themselves and the claimed invention. For example, the agent log described in Wolski would avoid any need for conflict resolution as proposed in applicants' two phase commit process. Since there is no need in Wolski for the processing recited in the present invention, applicants respectfully submit that one would not have extrapolated a teaching from Sonnier and somehow apply it to the two phase commit process of Wolski.

Since the justification offers no technical basis outside that contained in applicant's own specification, for applicants particular two phase commit process and merely restates the results of the combination in hindsight, applicants respectfully submit that the obviousness rejection

violates the well-known principle that applicants own disclosure cannot be used against him. The consistent criteria for determination of obviousness is whether the prior art would have suggested to one of ordinary skilled in the art that the claimed invention should be carried out and would have a reasonable likelihood of success viewed in light of the prior art. Both the suggest and expectation of success must be found in the prior art, not in applicants' disclosure.

In summary, applicants traverse the rejection of independent claims 8, 15 & 22 (as well as independent claims 1-3 to any extent relevant), based on the misinterpretation of the base reference Wolski, the misinterpretation of the secondary reference, Sonnier, the conclusionary nature of the reason for the combination, the lack of any teaching, suggestion or incentive in the art for the combination, and the use of applicants' own disclosure and results as a basis for the combination.
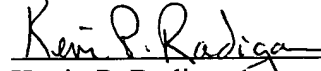
The dependent claims are believed patentable for the same reasons discussed above, as well as for their own additional features.

Withdrawal of the obviousness rejection is therefore respectfully requested.

All claims are believed to be in condition for allowance and such action is respectfully requested.

If the Examiner wishes to discuss this application with applicants' attorney, the Examiner is invited to contact their below-listed representative.

Respectfully submitted,

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